A Clinical Lecture

ON ABDOMINAL EMERGENCIES.

DELIVERED AT THE ROYAL INFIRMARY,
SHEFFIELD.

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It would be impossible in a single lecture to review, however briefly, the entire field of abdominal emergencies, and I shall therefore confine my remarks to the more important lesions which demand early recognition, and, as a rule, prompt surgical intervention.

The majority of acute abdominal cases may be referred to one or other of the following groups:

1. Acute intestinal obstruction.
2. Gastric and intestinal ulcers that have perforated.
3. Acute inflammatory lesions of septic origin.

Ruptured tubal gestation, twisted ovarian pedicle, and traumatic lesions of the abdominal viscera do not come within this classification, and will be referred to separately.

ACUTE INTESTINAL OBSTRUCTION.

Acute intestinal obstruction, as a primary affection, is most often due to strangulated hernia, external or internal; intussusception comes second in the order of frequency, while impacted gall stones and volvulus are less common causes. Not infrequently acute obstruction is grafted on to the chronic type. This is seen most often in cancerous stricture of the large intestine, the contracted lumen of the bowel being blocked by a mass of hard faeces.

Whatever the cause the symptoms are sudden in onset and progressive in character. The abdominal pain is diffuse and, while never quite in abeyance, is subject to periodic exacerbations caused by spasmodic contractions of the intestinal muscles in their endeavour to overcome the obstruction. The exhibition of opium may more or less completely mask the intestinal peristalsis, and it ceases entirely on the advent of peritonitis, but it is incorrect and misleading to assert, as is asserted by the authors of a well-known book on surgery, that "in acute cases intestinal paralysis dominates the picture."¹

Vomiting of a reflex character is frequently associated with the onset of the attack, but inasmuch as it is one of the initial symptoms of nearly all abdominal storms, it has no special significance.

The typical vomiting of acute obstruction sets in later, sometimes within a few hours, sometimes not until one or more days afterwards. Once it begins it continues with ever-increasing frequency, while the character of the vomited matter degenerates from bile-stained mucus to a brownish faecal-smelling fluid. Except in the rarely seen Richter's hernia, where only a portion of the circumference of the bowel is involved, there is complete obstruction to the passage of faeces and flatus. The abdomen gradually becomes distended, but until the onset of peritonitis it is neither tender nor rigid. The temperature and even the pulse may not show any marked departure from the normal for a day or two.

Strangulated External Hernia.

Strangulated external hernia requires little comment, but, as it is by far the most common cause of acute obstruction, it should always be thought of, and sought for, in the first instance.

Internal Strangulation.

Internal strangulation is most often caused by bands, the products of antecedent local peritonitis, a history of which may be obtained in many cases. They extend between the omentum, appendix, or Fallopian tubes and other parts of the abdomen. They give rise to hyperacute symptoms, with early vomiting. The patients are usually under 40 years of age. Strangulation by Meckel's diverticulum, and through chinks in the omentum, or broad ligaments, or in retroperitoneal pouches, are all rare, and cause symptoms similar to those produced by bands.

Post-operative Obstruction.

Post-operative intestinal obstruction requires a brief notice. It is nearly always due to kinking of the small intestine consequent on adhesions, and at first the mesenteric vessels are not implicated. It is seen most often after operations for acute appendicitis, the symptoms appearing about the end of the first week, and after the patient has apparently reached "smooth water." At first there are merely sharp attacks of colicky pain, and occasionally the intestinal peristalsis is sufficiently powerful to stretch the adhesions and effect relief; but, if not, the typical symptoms of obstruction gradually supervene. As the patients are under trained observers from the onset, operative measures for the relief of this form of obstruction are usually resorted to in good time.

Acute Intussusception.

Acute intussusception is the most common form of obstruction in children, and the clinical picture it presents is seldom obscure. The intermittent character of the pain is very pronounced, indeed the little sufferer may fall asleep between the attacks, which recur at intervals of a few minutes. A curved sausage-shaped tumour, which hardens at the onset of each paroxysm of pain, can almost always be detected somewhere along the course of the colon, while the right iliac fossa appears unduly empty. After a few hours there will be an escape of blood-stained mucus from the anus, and later still the intussuscepted bowel may sometimes be felt in the rectum. Obstructive vomiting is later in making its appearance. In young children there may be severe shock from the first.

Volvulus.

Volvulus occurs after middle life in patients who have suffered from chronic constipation. It concerns most often the sigmoid flexure, but occasionally the caecum is involved. Its most characteristic sign is the rapid onset of abdominal meteorism. The enormously-distended bowel can usually be outlined through the abdominal wall. Vomiting is a late symptom.

Obstruction from Gall Stones.

Obstruction from large gall stones that have ulcerated into the duodenum from the gall bladder is almost limited to elderly women. There will be a history of biliary trouble, and the impacted calculus may occasionally be felt through the abdominal wall. The symptoms are not usually very acute, and relief frequently comes by the stone passing onwards into the large bowel. I have, however, on two occasions seen hyperacute symptoms from this cause.

When acute obstruction supervenes in malignant stricture of the colon the symptoms appear gradually, and abdominal distension is always an early and pronounced factor. Owing to the muscular hypertrophy and accompanying dilatation of the colon on the proximal side of the stricture the peristaltic movements are remarkably powerful. There will be a history of increasing difficulty in getting the bowels to act, and long periods of absolute constipation may alternate with attacks of diarrhoea.

Contrary to what one might expect, the growth may for a long time produce little or no effect on the patient's general health. Indeed, in the last two cases I have seen there had been a distinct gain in weight during the preceding few months with, apart from constipation, no evidence of failing health or strength. The patient will frequently be able to locate the site of obstruction by noting where the peristaltic wave is arrested, and confirmation is afforded by ascertaining the amount of water that can be introduced per anum when the hips are raised on a pillow.

GASTRIC AND INTESTINAL ULCERS.

Perforating ulcers are found in the stomach, the duodenum, the lower end of the ileum, and in the large intestine. In the latter situation they are usually secondary to malignant disease. In the lower ileum they form one of the complications of typhoid fever, appearing during the third week or later.

Gastric ulcers are conveniently divided into the acute and the chronic varieties. The former are often multiple, and occur in young anaemic women. They are especially prone to perforate when situated on the anterior wall.

The chronic ulcer is usually single, of large size, and situated on one or other side of the pylorus. It occurs most often in men between the ages of 30 and 60 years.

The acute ulcer may run a latent course until it perforates, but in most cases there will be a definite history of pain on taking food. The pain is relieved by vomiting, and the vomited matter often contains dark blood.

There is usually a well-defined tender spot to the left of the middle line. When perforation is threatening the pain becomes continuous and the left rectus muscle rigid.

Duodenal ulcer gives rise to pain, which comes on one or more hours after meals, and is relieved by taking fresh food, the entrance of which into the stomach, by causing pyloric contraction, arrests for the time being the flow of the irritating gastric juice.

The symptoms of perforation are rarely ambiguous. The patient is suddenly seized with agonizing pain, which, in the case of gastric and duodenal ulcers, is situated in the upper abdomen. The pale, anxious countenance, the small, rapid pulse, and the subnormal temperature, attest to the presence of shock, which may, however, vary greatly both in respect of its intensity and duration. Locally, the most constant and characteristic sign is board-like rigidity of the recti muscles, with total cessation of abdominal respiratory movements. In a minority of cases the area of hepatic dullness is diminished or lost, owing to the escape of gases into the peritoneal space.

ACUTE INFLAMMATORY LESIONS OF SEPTIC ORIGIN.

Of the acute inflammatory lesions I shall refer only to cholecystitis, salpingitis, and appendicitis. (Septic peritonitis is always a sequel to some other disease. It will be dealt with in connexion with appendicitis.)

They have the following symptoms in common: Abdominal pain, more or less continuous; abdominal tenderness, at first diffuse, then becoming localized; rigidity of the overlying muscles; and, with the advent of suppuration, rigors.

The constitutional disturbances will show themselves in pyrexia, always greatest in the evening; increased pulse rate; a coated tongue with anorexia, thirst, constipation; and scanty high-coloured urine loaded with urates. Vomiting is usual, but it is not of a progressive character.

Cholecystitis is seldom seen apart from gall stones, a history of which will be forthcoming. The patients are nearly all elderly, and often fat, women. Palpation will in most cases reveal a distended gall bladder, which should not be mistaken for anything else.

Acute salpingitis is an ascending infection. A vaginal examination will define the swollen and exquisitely tender tubes, and the diagnosis will be strengthened by a history of antecedent or coexisting vaginal or uterine catarrh. In very acute cases the constitutional disturbances are apt to be alarming, and marked tympanites is nearly always present. In most cases, however, under expectant treatment, the storm becomes localized to the pelvis in a day or two.

Appendicitis.

Appendicitis has been so often discussed, that one is almost tempted to apologize for alluding to it. Its relatively great frequency, however, and the importance of duly appreciating its manifold phases, give it easily the first place among the lesions we are considering.

Of 427 abdominal emergency operations performed in the Sheffield Royal Infirmary during the last three years, 264 were for acute appendicitis, while during the same period the appendix was removed 110 times after the subsidence of one or more attacks.

We are still in the dark regarding the precise causation of the disease and of its alleged greater frequency during the last two decades; but when we consider its richness in lymphoid tissue, its low vascularity, and its dependent position, which militates against the easy escape of its contents into the caecum, we cannot feel surprised that it should be so vulnerable to attacks of inflammation. Its resemblance to the tonsils, both as to its structure and liability to septic infection, seems to justify the title "abdominal tonsil" which has been applied to it.

There are many grades in the severity of appendicular inflammation, and it will make for clearness if I begin with the mildest departure from the normal and ascend step by step to the most severe.

Following this plan, appendicular colic due to concretions, or to mucus retained by kinking or constriction of

the lumen, claims brief attention. It causes fairly sharp, colicky pains in the region of the appendix, but has no other untoward symptoms.

The next grade in severity is a simple catarrhal inflammation of the mucous lining, with mild constitutional disturbances and slight local pain and tenderness. Under suitable expectant treatment the symptoms subside in two or three days.

Next we have suppurative catarrh with more or less ulceration, or even gangrene of patches of the mucous membrane. The appendix is swollen, and flakes of lymph may be found on its peritoneal surface, but as yet there is no perforation.

This grade gives rise to severe symptoms. The temperature may run up to 103° or 104° F. in the evening, and the pulse to 120 per minute. The localized pain, tenderness, and rigidity are all pronounced, and a definite lump can usually be detected.

The progress of these cases may be either towards resolution or to perforation. If in the first-named direction, amelioration of the symptoms will set in on the second or third day. Perforation is revealed by a sharp increase in the pain, perhaps after it had begun to subside, by an increase in the pulse-rate, and by rigors.

If the appendix has been walled off by lymph before perforation actually takes place, the temperature will rise in ratio with the pulse, which will be full and bounding, and the iliac lump will become larger and more tender. After the storm caused by perforation has abated, the patient may look and feel better, and the symptoms of an acute abdomen may give place to those of a localized abscess.

In the less fortunate cases, where perforation is not preceded by lymph formation, or where the amount is inadequate to exclude the diseased appendix from the general peritoneum, we have grafted on the train of symptoms seen in the worst grade of the disease, the fulminating variety, in which the entire appendix is the seat of acute gangrene.

These symptoms, which are those of acute diffuse peritonitis, should be graven on our memories, because early diagnosis of the condition, followed by immediate operation, is necessary to the rescue of the unfortunate patient from what would otherwise be a certain and speedy death.

The patient may have been ill for a few days from what appeared to be an ordinary attack of appendicitis, or, more commonly, he is seized without previous warning. There will be intense pain in the right iliac region, rapidly extending to the rest of the abdomen. The face will be pale and anxious; the pulse rapid, small, and hard; and the temperature erratic—in the worst cases subnormal. The abdomen ceases to participate in the respiratory movements, becomes rigid and tender all over, and later distended and tympanitic. The legs are drawn up to relax the abdominal muscles and protect the body from the weight of the bedclothes. There is intense thirst with incessant vomiting, the vomited matter welling up apparently without effort on the part of the patient. The distended intestines become paralysed and their contents motionless. The heart beats ever faster and weaker, and the failing circulation manifests itself in the blue and cold lips and extremities. Towards the end mild delirium supervenes, and with its advent the patient ceases to complain of pain or even of tenderness.

Ruptured Tubal Gestation.

Ruptured tubal gestation should be suspected when during the second or third month of a supposed pregnancy the patient is seized with acute pain in the lower abdomen. There may have been nothing aberrant in the previous history of the case, but colicky pelvic pains and irregular uterine haemorrhages are not uncommon. The rapid outpouring of blood from the torn vessels is indicated by blanched lips, a fast soft pulse, great restlessness, and an incessant cry for more air. A bimanual examination will reveal a lump in one or other broad ligament, and possibly fluctuation in the pelvis behind the uterus.

Twisted Ovarian Pedicle.

Twisted ovarian pedicle is indicated by a sudden increase in the size of the tumour conjoined with the signs of sub-acute peritonitis in the lower half of the abdomen. Ascitic

fluid is rapidly poured out, and in the absence of a definite history may mask the true condition.

INJURIES.

Injuries to the abdominal viscera may result in acute infective peritonitis from the escape of the contents of the stomach, intestines, or bladder, or in severe loss of blood from rupture of the liver, spleen, or kidneys. When the mesentery is torn, in addition to internal haemorrhage there is the danger of the corresponding section of the bowel becoming gangrenous.

Severe shock is apt to be produced by abdominal contusions, even in the absence of gross visceral lesions, and we must in many instances be satisfied at first to wait and watch the progress of the case. The nature of the agent concerned in the injury, and the locality of its impact, may afford assistance in diagnosis, as may also an examination of the urine. Should the shock persist or deepen after an hour or more of watching, or should there be clear evidence of progressive internal haemorrhage, or of commencing peritonitis, the abdomen must be opened forthwith, and the condition dealt with according to its necessities.

DIFFERENTIAL DIAGNOSIS.

The chief difficulties in abdominal diagnoses are a fat abdomen, inability to elicit an exact history of the symptoms, and the order in which they appeared, the advent of peritonitis which overshadows the primary mischief, and the highly reprehensible habit which is still occasionally seen of giving opiates before the nature of the abdominal lesion has been revealed. By masking the symptoms, particularly the pain, it deludes the patient, and sometimes the doctor, into the belief that all is going well when such is not the case, and may be instrumental in delaying urgently necessary operative help. Moreover, opium inhibits peristalsis and diminishes leucocytosis, thereby seriously handicapping the patient's progress.

While in some cases it may be impossible to predict the nature of the catastrophe previous to exploration, one cannot too strongly deprecate the indiscriminate resort to abdominal section as a short cut to diagnosis.

A careful investigation of the history of the case, and of the order of onset of the symptoms, conjoined with the physical signs present, will seldom fail to indicate the nature of the lesion we are called on to deal with, and will permit of orderly preparation being made for whatever surgical measures may be necessary. The advantage of a thought-out plan over a haphazard operation is too obvious to need emphasizing.

When called on to investigate an acute abdominal case, we should keep in mind the threefold classification I have outlined.

In acute obstruction the remittent character of the pain, each exacerbation of which is accompanied by intestinal movements; the complete block to the passage of faeces and flatus; the progressive vomiting; the increasing abdominal distension; and the absence of pyrexia and of abdominal muscular rigidity, make up a picture easily read.

The sudden onset of agonizing pain in the upper abdomen of a young anaemic female, especially if there have been previous symptoms of stomach troubles, is highly suggestive of ruptured gastric ulcer, and, if accompanied by shock, abdominal tenderness, board-like rigidity of the recti muscles, and absence of abdominal respiratory movements, the suggestion becomes almost a certainty.

An antecedent history of pain coming on one or more hours after meals and relieved by taking fresh food will direct attention to the first part of the duodenum as the probable site of perforation.

The diagnosis of acute appendicitis is rarely difficult. Along with the general symptoms of inflammatory fever there will be in the right iliac region localized pain, localized tenderness, and localized muscular rigidity. In a large proportion of the severe cases there will also be a localized swelling, but it must not be forgotten that in the very worst cases this sign may be absent. An inflamed appendix, if directed upwards behind the caecum, may simulate renal trouble, and, when it lies wholly or in part in the pelvis, it may give rise to bladder or rectal irritation. In obscure cases leucocytosis, particularly if it increases from day to day, is suggestive of appendicular abscess.

TREATMENT.

Strangulated hernia, if seen early, should be reduced by gentle taxis, but, if there is the least doubt respecting the integrity of the bowel, taxis should give place to operation. If the patient's condition is good, and the bowel is not seriously damaged, a radical cure should be effected forthwith. It is not only a safeguard against recurrence, but is also a barrier against peritoneal infection from without. When the bowel is found to be gangrenous, wide resection with end-to-end anastomosis may be attempted in young and vigorous patients who do not show signs of profound toxæmia, but the majority of gangrenous cases are too ill to justify this procedure.

It is well to remember that unoperated-on cases have recovered, with, of course, an artificial anus, and that in very bad cases of gangrene the best treatment may be to make a simple incision into the sac without disturbing the exuded lymph, which has probably sealed off the peritoneum.

Obstruction from bands and other similar causes should be sought for systematically. The condition of the caecum is first ascertained. If it is empty, the obstruction will be found by following the small intestine upwards. The possibility of more than one point of obstruction being present must be borne in mind.

After freeing the obstruction, the condition of the bowel must be carefully investigated. If the portion above the constriction is much distended, and does not speedily discharge itself into the lower part, it should be withdrawn outside the abdomen, securely packed off with gauze, and opened on its antimesenteric border. After its contents have escaped, the opening is closed with a continuous suture. Advantage may be taken of the opening to introduce a saline aperient into the bowel. The establishment of an artificial anus in the small intestine is fraught with so many disadvantages and dangers that it should, if possible, be avoided.

Intussusception should, as a rule, be dealt with by operation. If seen early, an opening long enough to admit two fingers is sufficient. The procedure of reduction is of the simplest character, and need occupy only a few minutes. If for any reason operative measures are ruled out of court hydrostatic pressure may be tried. In quite early cases it will often be effectual; but the drawback to its use is that we cannot always tell whether the reduction is complete or not, and so valuable time may be lost. Should reduction be impossible resection of the involved segment of bowel must be performed, but it is nearly always unavailing in young children. A Paul's tube should be tied into each end of the cut bowel and the restoration of the intestinal canal left until a subsequent date.

To prevent recurrence after reduction the bowel should be anchored by a suture and an opiate given.

Gall stones become impacted in the small intestine, usually near its termination. After causing obstruction for a day or more they may be forced on into the caecum. They do not produce strangulation of the mesenteric vessels, and unless the symptoms are very acute, medical measures, such as the administration of belladonna, with hot fomentations to the abdomen, should be tried before having recourse to surgery. The treatment of volvulus is far from being satisfactory. It is usually quite impossible to reduce the twisted bowel, even after its contents have been allowed to escape. The best immediate treatment is to create an artificial anus. Later, the involved segment will require either excision or exclusion by short circuiting.

Acute obstruction secondary to a cancerous growth in the colon should be relieved by a proximal colostomy, the cancer being dealt with after the acute symptoms have passed away. Resection with immediate anastomosis of the colon in the presence of acute obstruction, is hardly ever successful and should not be attempted.

Where the patient is obviously too ill to stand much operative interference a short abdominal incision may be made under local anaesthesia, and a Paul's tube tied into the first coil of distended bowel encountered. Lives have occasionally been prolonged by this simple expedient; but it is unavailing in the presence of gangrene of the bowel.

In advanced cases of acute obstruction the stomach should be washed out preliminary to operation, in order to avoid the grave danger of vomited matter being drawn into the lungs during anaesthesia.

Ruptured gastric and duodenal ulcers should be closed by a double row of continuous sutures inserted well away from the friable edges of the perforation. Additional security is afforded by covering the line of suture with a piece of omentum. Should it be impossible to close the opening it must be drawn up to the surface, and, after anchoring the stomach walls to the parietal peritoneum, surrounded with gauze packing. Where the rupture has occurred soon after a meal, or a long interval has elapsed before operation, there will be extensive peritoneal fouling, and the abdomen will require thorough and systematic flushing. Towards the finish the shoulders should be raised to allow the saline solution to gravitate towards the pelvis.

If the rupture is a recent one, and particularly if the stomach was empty at the time, the soiling may be strictly local, when it is best dealt with by dry mopping. In all cases a pelvic drain tube should be introduced through a median suprapubic puncture, and the patient placed on a sloping bed.

Should gastro-enterostomy be indicated it is better to postpone its performance till a later date.

The treatment of appendicitis is a subject around which much controversy has taken place, and is still far from being settled.

In common with the majority of surgeons I believe that if all cases of acute appendicitis were operated on within the first few hours from the onset of symptoms we should have fewer deaths from the disease and a reduction in the average period of incapacity from work caused by it. At this very early stage the operation is easily performed and has hardly any risk as to life. During the three years 1905-8 there was not a single fatality among 57 patients operated on in the Sheffield Royal Infirmary for acute appendicitis uncomplicated with extra-appendicular abscess. In many of these cases the appendicular canal was full of pus and the mucous membrane gangrenous.

The objection, however, on the part of a large section of the public to operations that may not be absolutely necessary to life, and the hope in each particular case that, after all, non-operative measures may suffice, have hitherto, and will I fear always constitute difficulties in the way of very early interference.

If the case has not been seen, or if the question of operative interference has not arisen until after the lapse of twenty-four hours, it is probably better to postpone operation unless the symptoms are both acute and progressive. Mild cases usually begin to subside on the second day, and if carefully watched may be safely left until the storm has passed.

Immediate operation is called for during any stage of the disease by (1) a rapidly increasing pulse-rate, particularly if unaccompanied by a corresponding rise in the temperature; (2) the recrudescence of acute pain in the appendicular region after it had subsided, or a sudden increase in the severity of the pain; (3) extension of the pain, tenderness, and muscular rigidity to other parts of the abdomen; (4) commencing abdominal distension with or without vomiting; (5) rigors; (6) an increase in the size of the appendicular swelling after the third day; and (7) a change for the worse in the patient's expression.

If there is irritability of the rectum with, perhaps, an abundant escape of mucus, we should suspect and examine for a pelvic abscess.

Operative Details.

As to operative details, I shall only allude to abscess cases and to those grave and, until quite recently, commonly fatal, cases in which septic infection has spread from the appendix to the general peritoneum. The former may be dealt with by direct incision into the abscess cavity in cases in which the abscess is large and well encysted; or, if there is any doubt on the latter point, by opening the peritoneum to the inner side of the swelling, and, after walling off the intestines and pelvis with gauze, raising up the caecum from the outer side, when the abscess will be exposed. The diseased appendix should be removed when it can be easily reached, but we are not justified in running the risk of peritoneal infection by vigorous or prolonged efforts to remove it if deeply placed. In upwards of 90 per cent. of abscess cases treated by drainage alone there is no further appendicular trouble, while in the small minority of

cases where a fistulous track will not close the offending appendix can be safely removed on a subsequent occasion.

Owing largely to the work of American surgeons, the treatment of acute diffuse peritonitis, whether secondary to perforative appendicitis or other abdominal lesions, has been entirely revolutionized; and, although Murphy's experience of 35 recoveries out of 36 consecutive cases of acute general peritonitis will probably long remain a record, there can be no doubt that a great reduction has been effected in the mortality-rate of this dread disease. The improved method of treatment is in some respects a reversion to the elementary principles of surgery long known and practised in dealing with acute inflammations elsewhere in the body. In other respects it utilizes recent additions to our knowledge of the physiology and pathology of the peritoneum.

It recognizes that the patient's first and most important line of defence against the ravages of peritoneal infection lies in the undamaged endothelial cells which clothe the abdominal walls and viscera, and that it is worse than useless to try to remove, or to destroy by chemical means, the invading bacteria, because not only is it impossible to do so, but the attempt involves grievous damage to the peritoneal surface and opens up fresh channels through which the septic toxins can gain access to the circulation. It substitutes for the heroic scrubbing, flushing, and evisceration of former times the simple treatment applicable to an acute abscess that has formed around an infected substance elsewhere in the body. It consists in—

1. Removal of the primary cause of infection with the least possible interference with the surrounding tissues. No attempt is made to wash away pus or to remove exuded lymph. (In very bad cases, as I shall show presently, removal of the appendix may be omitted.)

2. The provision of free abdominal drainage so as to relieve tension with all its accompanying evils. A Keith's tube inserted into the pelvis is usually sufficient, but it may be supplemented by others of indiarubber leading down to the site of the appendix and elsewhere.

3. Placing the patient on a sloping couch so that the shoulders shall be on a considerably higher level than the pelvis. Sufficient elevation is secured by placing the head castors of the bed on two kitchen chairs. The primary object of this posture is to permit of the descent of septic material towards the pelvic basin, where the rate of absorption by the lymphatic vessels is much slower than in the upper abdomen. It likewise enables the patient to breathe better and to more easily get rid of accumulations of gases in the stomach.

4. Giving large quantities of saline solution by the bowel. The large intestine, particularly the caecum, readily absorbs water, which is badly needed by the poisoned tissues, but which cannot be retained by the stomach. By introducing a large amount of water into the system it is contended that peritoneal absorption is not only arrested, but that, by a reversal of the stream, the poisons already taken up are eliminated.

The saline solution may be given continuously by means of a rectal tube with several terminal openings connected with a reservoir, which should be placed a few inches higher than the level of the rectum. The flow should be so adjusted that from one to two drops escape each second. Where the continuous method is inapplicable, or is irksome to the patient, it may be replaced by the intermittent plan, half a pint being very slowly introduced every two hours or so through a funnel and tube. In very bad cases anti-streptococcal serum may be given.

Secondary abscesses should be promptly evacuated and drained, and threatening intestinal obstruction met by immediate intervention.

Nothing should be given by the mouth for twenty-four hours or longer, and vomiting should be dealt with by washing out the stomach. Distension is relieved by turpentine enemata. Purgatives are unnecessary, the bowels acting naturally on the second or third day.

Murphy stipulated that in all cases of general peritonitis the source of infection, whether it be a ruptured gastric ulcer or a gangrenous appendix, must be dealt with.

In hospital practice one meets with not a few cases of neglected appendicitis, with wide peritoneal infection, where the patient is so very ill that even the minimum interference advocated by Murphy would almost certainly

hasten rather than retard the impending dissolution; and yet some of these cases may be rescued by the very simple procedure of making a suprapubic puncture, under local anaesthesia, and passing a Keith's tube down into the pelvic basin. Recovery is, of course, slow on account of the prolonged suppuration which necessarily accompanies Nature's method of shedding the gangrenous appendix; but I am firmly persuaded that several of my patients owe their lives to the restriction of operative measures to the extent I have indicated, combined with the other adjuncts to treatment that I have already mentioned.

The procedure can be carried out at once, without moving the patient to hospital or wasting valuable time in elaborate preparations.

The prospect of success in ruptured gastric and duodenal ulcers is less hopeful, but even in these cases it should be tried if more ambitious measures are out of court. Upwards of a year ago I saw with Dr. Buckley, of Chesterfield, a man who had a ruptured duodenal ulcer of forty-six hours' duration. There were all the evidences of diffuse peritonitis; the pulse was barely discernible, and the extremities were blue and cold.

Our surgical armament was, I think, a record in simplicity. It consisted of a razor in lieu of a scalpel, a piece of gas rubber tubing, a few forceps, and a saucepan. The patient, although he ultimately died, made a splendid rally, and seemed to justify for a time the hope that he might recover.

REFERENCE.

¹ Rose and Carless, seventh edition, p. 1124.

APPENDICOSTOMY IN DIFFUSE SEPTIC PERITONITIS.*

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IN the *Annals of Surgery* (February, 1906) Murphy of Chicago published an account of his now well-known method of treatment of diffuse septic peritonitis. In brief, this consists in rapid elimination of the cause of the peritonitis—for example, the removal of a gangrenous appendix; free drainage of the peritoneum by means of rubber tubes passed through the operation wound and into the bottom of Douglas's pouch through a suprapubic puncture; the assumption by the patient of the semi-sitting position after operation; the prevention of peristalsis by withholding all food and fluids by the mouth; and the introduction into the circulation of large quantities of fluid by absorption from the rectum. He claims that in this way the current in the lymphatics of the peritoneum is reversed, that membrane becoming a secreting instead of an absorbing surface, with the result that septic matter is washed away in the free flow that takes place through the drainage tubes. Further, toxins already in the blood are diluted and their elimination facilitated by the free diuresis that is induced. Murphy states that only one death occurred amongst the last 29 cases treated by him in this way.

Of the value of this method of treatment there can be no doubt. Success, however, largely depends upon the quantity of fluid that the rectum can be made to absorb. Murphy introduces a nozzle with three or four openings into the rectum, and attaches it by means of rubber tubing to a bag containing warm water. The bag is slung 3 or 4 in. above the plane of the rectum, so that the water runs in at very low pressure, and all distension of the bowel is avoided. I have attempted to carry out this treatment on many occasions, but have never succeeded in getting the rectum to absorb the large quantities of fluid that Murphy mentions. With the patient sitting in a nearly upright position it is almost impossible to prevent leakage through the anus. This not only stultifies the procedure but causes the patient a good deal of annoyance. In many cases also the rectum becomes very intolerant of the prolonged presence of the tube, and straining occurs. Many other surgeons whom I have specifically questioned upon this point appear to have experienced the same difficulty.

* This paper was written before Mr. Keetley read his paper on the utility of the appendix before the Surgical Section of the Royal Society of Medicine. I believe no better example of the value of appendicostomy can be given than in the treatment of desperate cases of diffuse septic peritonitis.

It occurred to me that the appendix might with advantage be utilized for the purpose of introducing fluid into the large bowel, and on several occasions I have done so with marked success. When the appendix is healthy—for example, in peritonitis following perforation of a gastric ulcer—an incision is first made over the lesion, which is rapidly treated in such a way as to prevent further contamination. No attempt is made to cleanse the peritoneum by irrigation or mopping, but adequate drainage is provided for, preferably by means of rubber tubes passed through the wound. Then, instead of making a suprapubic puncture to allow of the introduction of a rubber tube into Douglas's pouch, the abdominal cavity is again opened by a small vertical incision over the lower part of the right rectus, the fibres of which are separated. The appendix is pulled up into the wound, and the distal portion cut off. The stump is then fixed in the upper angle of the wound by one or two silk sutures passing through all its coats and the skin. The open mouth of the stump is thus practically flush with the skin, and through it a small rubber catheter is passed into the caecum. A large rubber drainage tube is finally passed to the bottom of Douglas's pouch through the lower part of the wound. The patient is then put back to bed, with the rubber catheter projecting through the dressings, care being taken to prevent it being accidentally pulled out. Finally, the patient is placed in the Fowler position, and the catheter connected by rubber tubing to a tank in which is warm normal salt solution. The tank stands on a table at the bedside, and should not be more than 3 in. above the plane of the caecum. The flow of water is regulated by a clamp on the rubber tubing.

If the peritonitis is secondary to disease of the appendix, the above procedure must be modified somewhat. An incision is then made over the appendix and its condition ascertained. If, as is often the case, the part nearest the caecum is comparatively healthy, the distal portion is cut off and the stump sutured to the skin, as already described. If this is impracticable, the appendix is extirpated in the usual way and a small portion of the caecal wall nearest the surface sutured to the skin. A puncture sufficient to admit the rubber catheter is then made in it. It is advisable in these cases to introduce a large rubber tube into the pelvis through a separate suprapubic puncture.

I use normal salt solution in preference to plain water, believing it to be less irritating to the mucous membrane of the bowel. Not more than 1 pint per hour is admitted in order to avoid distension, and care must be taken not to place the supply tank at too high a level. When absorption ceases, as much fluid is evacuated from the rectum as is introduced into the caecum, and the supply is then cut off. It is not necessary to leave in the catheter for more than forty-eight hours. At the end of that time it is withdrawn, the mucous membrane of the stump of the appendix is removed for a little distance down, and the opening closed by uniting the sero-muscular coats with a catgut stitch. Finally, any adhesions between the skin and the stump are gently broken down and the latter allowed to retract. In this way the risk of a faecal fistula is minimized.

In practice this procedure has many advantages over that employed by Murphy. It does not prolong the initial operation by more than two or three minutes. I have removed a gangrenous appendix, sutured the stump in the wound, and provided for drainage, with the patient on the operating table for only twelve minutes. The quantity of fluid admitted to the bowel can be regulated exactly, while the whole length of the large intestine takes part in its absorption. The patient suffers practically no discomfort, as no disturbance of bedclothes is necessary, and there is no leakage from the anus until absorption is at an end. Further, stimulants and nutrients can be easily and rapidly administered, if desired, by simply disconnecting the tank and connecting the catheter to a glass funnel into which they are poured.

Illustrative Case.

Mrs. A., aged 36, was admitted into the Queen's Hospital on August 4th, 1908. Three weeks prior to admission she had aborted, and two weeks later was seized with severe hypogastric pain, which had become much worse lately. When seen she presented the typical appearance of advancing peritonitis. The temperature was 103°, and the pulse 140, small, and thready.